

# The “Three Refinements” of the Hong Kong dollar Linked Exchange Rate system two years on

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The decoupling of the Hong Kong dollar exchange rate from that of the renminbi attests to the success of the three refinements in meeting their objectives. This outcome has been achieved without the HKMA having to intervene in the foreign exchange market in the past two years.

In a fully credible exchange rate target zone regime, the spot exchange rate normally stays inside the band but does not have a natural tendency to converge toward the centre of the zone. While a certain level of interest rate differential between the Hong Kong dollar and the US dollar may persist, it should not grow significantly larger than what is implied by the width of the Convertibility Zone. Judged against this framework, the developments since May 2005 point to increased credibility of the refined Linked Exchange Rate system.

## Introduction

The Hong Kong Monetary Authority (HKMA) introduced the three refinements to the Hong Kong dollar Linked Exchange Rate System (LERS) in May 2005 to remove uncertainty about the extent to which the exchange rate may strengthen and help align Hong Kong dollar interest rates more closely with their US dollar counterparts. Two years have passed since the three refinements were introduced. The second anniversary is a good time to review the operations of the LERS to better understand interest rate and exchange rate dynamics after the reform.

This paper attempts to address on the following questions: Have the “three refinements” achieved their intended objective of normalising Hong Kong’s monetary conditions amid large speculative capital inflows? Can the developments in the money and foreign exchange markets since May 2005 be characterised as normal? What do those developments tell us about the credibility of the refined LERS? What should we expect from the relationship between exchange-rate and interest-rate spreads in a fully credible target zone regime?

## Why were the “three refinements” introduced?

Hong Kong experienced persistent inflows of funds during 2003-2005 driven by weakness of the US dollar, market speculations about a revaluation of the renminbi, and strong economic recovery in Hong Kong. In the absence of an explicit commitment by the HKMA to sell Hong Kong dollars on the strong side, the Hong Kong dollar spot exchange rate appreciated abruptly from around 7.80 to 7.70 in late 2003. To stabilise the exchange rate, the HKMA stepped in to conduct strong-side monetary operations. As a result, the Aggregate Balance expanded sharply to peak at about HK\$55 billion in early 2004, pushing Hong Kong dollar interbank interest rates downward to almost zero. Despite the negative interest rate differentials, no obvious outflows of funds occurred for a considerable period because market participants acted on the belief that the Hong Kong dollar would appreciate alongside the renminbi and used the Hong Kong dollar as a trading proxy. These speculative activities made the interest rate adjustment mechanism under the LERS ineffective.

To normalise monetary conditions and to make the interest rate adjustment mechanism more effective, the HKMA introduced the three refinements to the LERS on 18 May 2005: establishing a strong-side Convertibility Undertaking (CU) at HK\$7.75/US\$, shifting the weak-side CU from HK\$7.80/US\$ to HK\$7.85/US\$, and creating a Convertibility Zone defined by CUs, within which the HKMA may conduct market operations consistent with Currency Board principles.

After the three refinements were introduced, the HKMA also made efforts to educate the public about the case for continuing the LERS and the rationale of the reforms, and convince market participants to decouple the relationship between the Hong Kong dollar and the renminbi. The Chief Executive of the HKMA reiterated that the Hong Kong Government had no intention to change the anchor currency for the Hong Kong dollar peg to the renminbi in speeches and his weekly Viewpoint column.<sup>1</sup> Research papers were published to provide analytical backing to the argument that Hong Kong's economic and trade structure support the case for a continued peg with the US dollar.<sup>2</sup> There was also close communication between HKMA staff in charge of market operations and their market counterparts. These efforts helped anchor market expectation and achieve the objectives of the three refinements to normalise domestic monetary conditions and promote the smooth functioning of the Currency Board system.

## Have the objectives been met?

Although the Hong Kong dollar spot exchange rate stayed close to the strong-side CU in the latter half

of 2005 and in 2006, the CU was never triggered and the Aggregate Balance remained stable (Chart 1). In other words, the Hong Kong dollar spot exchange rate has decoupled from that of the renminbi. This was an important achievement, especially considering that other regional economies were experiencing strong net capital inflows and the renminbi was facing continuous and strong political pressures to appreciate. Equity inflows to the Hong Kong dollar market, driven partly by the US\$10 billion initial public offering (IPO) of the Bank of China in May 2006 and the US\$15 billion IPO of the Industrial and Commercial Bank of China in October 2006, helped keep Hong Kong dollar interest rates low. However, instead of further pushing down interest rates and the spot exchange rate, investors expatriated capital in search for higher yields. As a result, portfolio outflows more than offset equity inflows. These capital flow patterns indicate that market players have avoided testing the resolve of the HKMA to honour the CUs.

CHART 1

Movements in Hong Kong dollar exchange rate



Source: HKMA.

<sup>1</sup> Joseph Yam issued more than 10 Viewpoint articles on the refined LERS between May 2005 and April 2007, including, "The Strong-Side Convertibility Undertaking" on 19 May 2005, "The Convertibility Zone" on 26 May 2005, "Refinements to the Linked Exchange Rate System" on 16 June 2005, "The First Anniversary of the Three Refinements" on 18 May 2006, "The Future of the Hong Kong Dollar" on 24 August 2006, "Twenty-Third Anniversary of the Linked Exchange Rate System" on 12 October 2006, and "The Renminbi and the Hong Kong Dollar" on 30 November 2006.

<sup>2</sup> Examples include "Hong Kong's Economic Integration and Business Cycle Synchronisation with Mainland China and the US", Research Memorandum 11/2006; "Structural Determinants of Hong Kong's Current Account Surplus", Research Memorandum 14/2006, and "Hong Kong's Trade Patterns and Trade Elasticities", Research Memorandum 18/2006.

While the negative spreads of Hong Kong dollar interest rates compared with the corresponding US dollar interest rates persisted, they never exceeded 150 basis points, and in any case were much smaller than the levels seen in late 2004 (Chart 2). Along with interest rates increases in the US, rising Hong Kong dollar interest rates had a timely cooling effect on the local property market. In fact, from a macroeconomic point of view, since the introduction of the three refinements, the local monetary conditions have been broadly neutral and can be considered as appropriate for the prevailing cyclical conditions in Hong Kong.

**CHART 2**  
Movements in interest rate spreads

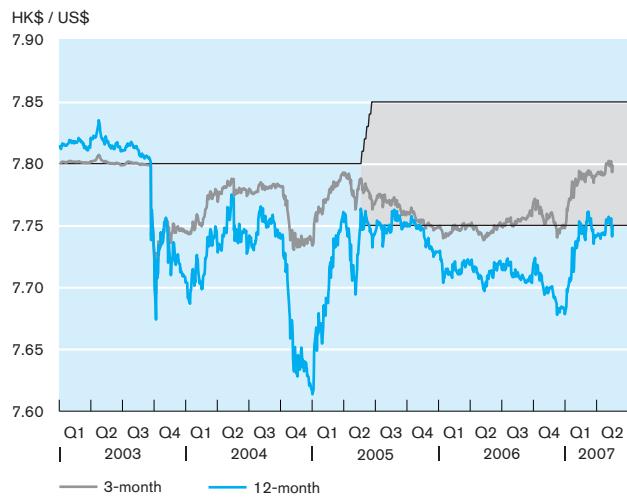


Source: HKMA

However, the decoupling of the Hong Kong dollar from the renminbi in the forward exchange market took longer than in the spot market. While the three-month Hong Kong dollar forward exchange rate has been fluctuating within the Convertibility Zone most of the time, the 12-month Hong Kong dollar forward exchange rate was persistently outside the Convertibility Zone from late 2005 to early 2007 (Chart 3). In addition, the broad movements in the 12-month Hong Kong dollar forward exchange rate correlated closely with those in the 12-month renminbi non-deliverable forward exchange rate from May 2005 to the end of 2006 (Chart 4).

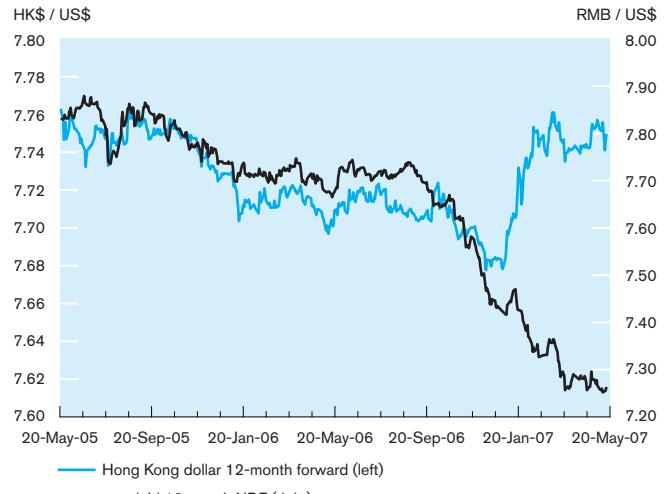
<sup>3</sup> Nevertheless, the exchange rates of forward contracts longer than one year continue to be stronger than the strong-side CU.

**CHART 3**  
Hong Kong dollar forward exchange rates



Source: HKMA

**CHART 4**  
12-month Hong Kong dollar and renminbi forward rates

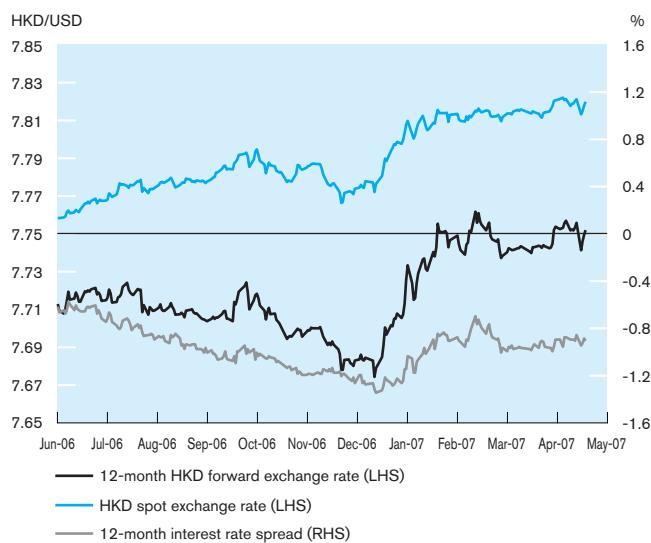


Source: HKMA

In early 2007, the situation started to change. The 12-month Hong Kong dollar forward exchange rate depreciated towards the strong-side CU despite the continued appreciation of the renminbi. This showed that the 12-month forward exchange rate had also decoupled from that of the renminbi<sup>3</sup> (Chart 4). At the same time, the Hong Kong dollar spot exchange rate depreciated beyond 7.80, the centre of the Convertibility Zone, in the first quarter of 2007, and

the 12-month interest rate differential narrowed to about 100 basis points (Chart 5). This pattern of movement is consistent with the "covered interest rate parity" relationship.

**CHART 5**  
Adjustments of Hong Kong dollar forward exchange rate



Source: HKMA.

## What should we expect in a credible target zone regime?

Theoretical arguments imply that in an exchange rate target zone regime, which the refined LERS encompasses, the position of the spot exchange rate within the band does not have any particular economic significance, and there is no natural tendency for the spot rate to revert to the centre of the band. When economic fundamentals create upward pressure on the currency, unless the monetary authority intervenes, the exchange rate will tend to move towards the strong side of the target zone. However, the boundary is unlikely to be touched if the target zone is credible, because as the exchange rate moves very close to the boundary, market participants will have no incentive to push it to the limit as they know that the monetary authority will

then step in and pull it back.<sup>4</sup> Hence the exchange rate is likely to hover around the boundary of the band as long as the economic fundamentals do not change. Once the economic fundamentals change to call for a weaker exchange rate, the whole process will reverse and the exchange rate will move towards the weak-side of the band, but again is unlikely to touch it.

Movements in the Hong Kong dollar spot exchange rate since the introduction of the three refinements have largely conformed to this theory. When the spot exchange rate was under appreciating pressure during the second half of 2005 and the first quarter of 2006, it stayed close to the strong-side CU, but the CU was never triggered. Twice the exchange rate was only several pips away from the strong-side CU; when that happened, however, the exchange rate immediately depreciated away from the strong-side CU. The spot exchange rate started to depreciate in December 2006 and has now moved towards the weak-side of the Convertibility Zone, but is still some distance away from it. It remains to be seen how the spot exchange rate will behave when it is close to the weak-side CU.

A fully credible exchange rate target zone regime also implies that the forward exchange rates should either be inside the target zone or stay close to the band. If the forward rates are far outside the target zone, profits can be made by entering into outright forward contracts, provided that the future spot rate stays within the target zone. If market participants have faith in the monetary authorities' commitment to defend the band, they will have incentives to conduct such arbitrage and the forward rates will be brought within the target zone. However, if market participants have doubts about the monetary authorities' ability or willingness to defend the band, then such arbitrage activities might not occur and the forward rates might continue to lie outside the zone.<sup>5</sup>

<sup>4</sup> Further research is needed to understand better under what circumstances the boundaries may be touched and official intervention may be triggered in a credible target zone regime.

<sup>5</sup> Such doubts need not imply a belief that the target zone concept will be abandoned but merely that the width of the zone might be increased. Indeed, some market commentators raised this possibility in the aftermath of the introduction of the three refinements.

There are two plausible theories, which are not necessarily mutually exclusive, that might explain why the 12-month Hong Kong dollar forward exchange rate was persistently stronger than the strong-side CU of 7.75 from late 2005 to 2006. The first theory emphasises the importance of opportunity cost: since the local equity market offered very high rates of returns for the major market players, they did not take the trouble to arbitrage away the potential profits arising from the mis-pricing of the forward exchange rates. They would be further discouraged from conducting these arbitrage trades if transaction costs and the inherent risks involved in such longer-term trades are taken into consideration: as the holding period of an open position of an arbitrage trade lengthens, the marked-to-market losses in the interim period are potentially larger and more volatile.

The second theory hypothesises that market participants had some initial worry that the HKMA might widen the band in one to two years. The lingering doubt in the market about the HKMA's commitment to not widening the band prevented arbitrage trades from driving the forward exchanges towards the strong side CU. However, these worries have diminished since early 2007.<sup>6</sup> The HKMA's communication strategy played a key role in changing market perception: in preparation for the Hong Kong dollar reaching parity with the renminbi, HKMA senior executives and staff maintained close communication with traders and researchers throughout the third quarter of 2006. This effort, together with speeches given and articles written by the Chief Executive of the HKMA, helped stabilise market expectation.

The strengthened credibility of the refined regime in recent months reflects the HKMA's deeds as well as

its words. Since January 2007, when the HKMA has been seen to be maintaining the LERS even as the renminbi first reached parity with and then became stronger than the Hong Kong dollar, market participants appeared to have finally become convinced that the LERS would not be abandoned or altered after all. This change in market perception led to arbitrage activities that brought the one-year forward rate inside or close to the strong-side CU. It also helped make the appreciation of the renminbi beyond the Hong Kong dollar spot rate a non-event.

The existence of a certain level of interest rate spread against the anchor currency is consistent with a fully credible exchange rate target-zone regime. Under such a regime, just as there is no natural tendency for the spot exchange rate to revert to the centre of the band, there is also no natural tendency for the interest rate spread to become zero. Under the covered interest rate parity condition, if the target zone system is fully credible and both the Hong Kong dollar spot exchange rate and the 12-month forward exchange rate stay inside the Convertibility Zone, then the current width of 1,000 pips of the Convertibility Zone can at most accommodate a negative interest rate spread of 127 basis points, assuming zero transaction cost.<sup>7</sup> An interest rate spread larger than 127 basis points implies that the forward exchange rate lies outside the convertibility zone, assuming the covered interest rate parity condition holds.<sup>8</sup>

The movements in the Hong Kong dollar interest rate spreads against the US dollar since the introduction of the three refinements convey the same message as in the case of the Hong Kong dollar forward exchange rates: while market frictions and

<sup>6</sup> Market participants still appear to have considerable doubts about the credibility of the strong-side CU in the medium term (i.e., within two to five years), although the lack of liquidity in the market of forward contracts of longer duration makes the interpretation of forward discount somewhat ambiguous.

<sup>7</sup> This is calculated using the following covered interest rate parity condition:

$$\frac{1+i_{t,m}^{\text{HKD}}}{1+i_{t,m}^{\text{USD}}} = \frac{F_t^{t+m}}{S_t}$$

where  $i_{t,m}$  stands for LIBOR or HIBOR with a maturity of  $m$  months;  $F_t^{t+m}$  is the  $m$ -month forward exchange rate;  $S$  is the spot exchange rate.

<sup>8</sup> Our analysis shows that the covered interest rate parity does hold for Hong Kong after allowing for a reasonable amount of transaction costs.

opportunity costs might have prevented market players from conducting arbitrage, and market participants might have had doubts about the HKMA's future commitment to the LERS, the opportunity costs have declined and the doubts have diminished considerably since January 2007. While the interest rate spreads widened to 150 basis points in late 2006, they have now declined to around 100 basis points. As pointed out earlier, the depreciation of the spot exchange rate and the narrowing of the interest rate spreads since January 2007 were part of the same process that moved the 12-month forward exchange rate close to the strong-side CU.

Inside the target zone, and some distance away from the intervention limits, changes in the spot exchange rate and changes in the interest rate spread are determined by various market forces. Ample empirical evidences from around the world show that short-run movements in spot exchange rates are not predictable by "fundamental" variables such as interest rate differentials, trade balances, prices, and money supply. In statistical terms, the spot rate tends to move as a "random walk". The short-term interest rates, on the other hand, are determined by the demand for and supply of reserve balances (the Aggregate Balance) of the banking system. In the absence of interventions or discretionary open market operations within the target zone, the supply of reserve balances to the banking system as a whole will be constant as long as the exchange rate does not touch the boundaries of the zone. The demand for reserves will primarily reflect precautionary motives on the part of the banks, which will depend on prevailing market conditions. The market for reserve balances is cleared by changes in the interbank interest rates.

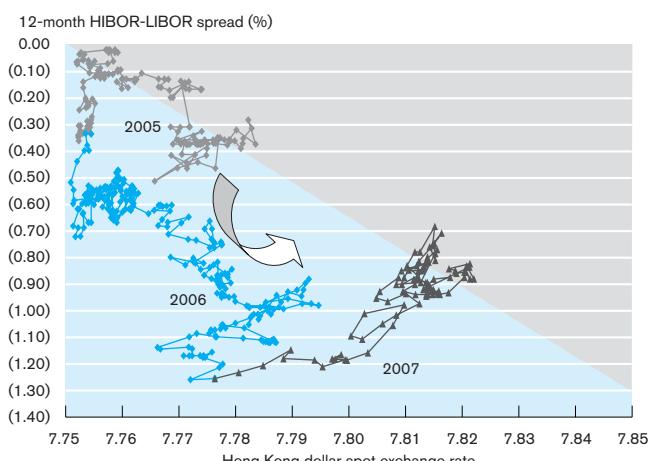
Such behaviour patterns imply that, in a credible exchange rate target zone, the correlation between movements in the exchange rate and the interest rate

spread can be positive, zero, or negative as a result of market forces. What sign the correlation takes at any particular time depends on the underlying sources of the changes in the exchange rate and the interest rate spread. Nevertheless, while we should not expect any particular stable correlation between changes in the exchange rate and changes in the interest rate, in normal market circumstances, the daily changes tend to be small and smooth.

The correlation between changes in the Hong Kong dollar exchange rate and changes in the interest rate spread against the US dollar since May 2005 has largely followed the above theoretical predictions. The grey, blue and black lines in Chart 6 show the movements in the 12-month interest rate spread and the spot exchange rate in 2005, 2006 and 2007 respectively.<sup>9</sup> From late 2005 to early 2006, as the exchange rate stabilised around 7.75 and the negative interest rate spread widened, the correlation between the two was almost zero. As the spot exchange rate depreciated in response to the widening of the negative interest rate spread throughout 2006, the relationship between the two became negative. When the spot exchange rate depreciated and the negative interest rate spread narrowed in 2007, the correlation became positive. It is also clear that the daily changes in the exchange rate and the interest rate spread were generally smooth and small.

CHART 6

Movements of interest rate spread and spot exchange rate



Source: HKMA.

<sup>9</sup> When both the spot and the 12-month forward exchange rates are within the Convertibility Zone, data points showing the movements in the 12-month interest rate spread and the spot exchange rate will fall within the grey area in Chart 6.

The experience so far also shows that the refined LERS has worked well without recourse to the third element of the three refinements, which allows the HKMA to conduct discretionary monetary operations within the Convertibility Zone if necessary. In fact, intra-zone intervention only took place once to smooth out interest rate volatility induced by an IPO shortly after the three refinements were introduced. Since then, there has been no intervention, even during several very large IPOs in 2006.

Developments so far have shown that the refined regime has become more credible, as the Hong Kong dollar forward exchange rate drifted back towards 7.75 and the interest rate spreads narrowed. The decoupling of the Hong Kong dollar from the renminbi, and the more-or-less neutral monetary conditions prevailing in Hong Kong, attest to the success of the three refinements. This outcome has been achieved without the HKMA having to intervene in the foreign exchange market in the past two years.

## What can we conclude?

To summarise, a fully credible exchange rate target zone regime should exhibit the following characteristics:

- > The spot exchange rate normally does not touch the CUs, as market expectation of intervention by the HKMA at the limits will stabilise the market exchange rate. The spot rate does not necessarily have a tendency to move towards the centre of the zone. In fact, no particular significance should be attached to the position of the spot exchange rate within the Convertibility Zone.
- > The forward exchange rates should normally be inside the Convertibility Zone or stay close to the CUs, unless there are sufficiently large market frictions and transaction costs that prevent arbitrage from taking place.
- > A certain level of spread of the Hong Kong dollar interest rate against the US dollar is consistent with a fully credible Convertibility Zone. The spread does not necessarily move towards zero.
- > There is no stable pattern of correlation between the interest rate spread and exchange rate movements within the Convertibility Zone.
- > In a fully credible target zone regime, there is little need for intra-zone intervention, unless market anomalies existed.